I. **Amendments to the Claims**

1. (Cancelled)

2. (Currently amended) The photodiode of claim ~~1~~ 7 further comprising an anode layer for collecting holes.

3. (Currently amended) The photodiode of claim ~~1~~ 7 further comprising a cathode layer for collecting electrons.

4. (Currently amended) The photodiode of claim ~~1~~ 7 wherein the first p-type semiconductor layer is InAlAs.

5. (Currently amended) The photodiode of claim ~~1~~ 7 wherein the n-type semiconductor layer is InAlAs.

6. (Currently amendedl) The photodiode of claim ~~1~~ 7 wherein the second p-type semiconductor layer is InGaAs.

7. (Currently amended) A photodiode comprising:

a semi-insulating substrate layer;

a first p-type semiconductor layer;

an n-type semiconductor layer; and

a second p-type semiconductor layer disposed between the first p-type semiconductor layer and the n-type semiconductor layer, the second p-type semiconductor being directly adjacent to the n-type semiconductor, the second p-type semiconductor layer having a graded doping concentration along the path of the carriers, ~~The photodiode of claim 1 wherein~~ the graded doping concentration ~~defines~~ defining a first concentration adjacent to the first p-type semiconductor layer and a second concentration adjacent to the n-type semiconductor layer,

~~and further wherein~~ the first concentration ~~is~~ being greater than the second concentration.

8. (Previously Presented) A photodiode comprising:

a first p-type semiconductor layer;

an n-type semiconductor layer; and

a second p-type semiconductor layer disposed between the first p-type semiconductor layer and the n-type semiconductor layer such that the second p-type semiconductor is directly adjacent to the n-type semiconductor, the second p-type semiconductor layer having a graded doping concentration,

the graded doping concentration defining a first concentration adjacent to the first p-type semiconductor layer and a second concentration adjacent to the n-type semiconductor layer, the first concentration being greater than the second concentration, and

the first concentration being located at a position x_o and defining a concentration p_o, and the graded doping concentration being governed by the following equation:

$$p = p_o e^{\frac{-x}{D}}$$

over the depth D of the second p-type semiconductor layer for all x and D greater than zero.

9. (Previously Presented) The photodiode of claim 8 wherein the depth, D, for the first concentration is between 800 and 1000 angstroms in length.

10. (Previously Presented) A method of fabricating a photodiode comprising:

providing a substrate layer;

depositing an n-type semiconductor layer on the substrate;

depositing a second p-type semiconductor layer having a p-type dopant on the n-type semiconductor layer;

grading the p-type dopant of the second p-type semiconductor layer from a first concentration to a second concentration, the first concentration being greater than the second concentration; and

depositing a first p-type semiconductor layer on the second p-type semiconductor layer, the second p-type semiconductor layer being between the first p-type semiconductor layer and the n-type semiconductor layer such that the second concentration is directly adjacent to the n-type semiconductor ayer.

11. (Original) The method of claim 10 further comprising the step of affixing an anode to collect holes.

12. (Original) The method of claim 10 further comprising the step of affixing a cathode to collect electrons.

13. (Original) The method of claim 10 wherein the first p-type semiconductor layer is InAlAs.

14. (Original) The method of claim 10 wherein the n-type semiconductor layer is InAlAs.

15. (Original) The method of claim 10 wherein the second p-type semiconductor layer is InGaAs.

16. (Previously Presented) A method of fabricating a photodiode comprising:

providing a substrate layer;

depositing an n-type semiconductor layer on the substrate;

depositing a second p-type semiconductor layer having a p-type dopant on the n-type semiconductor layer;

grading the p-type dopant of the second p-type semiconductor layer from a first concentration to a second concentration, wherein the first concentration is greater than the second concentration; and

depositing a first p-type semiconductor layer on the second p-type semiconductor layer, wherein the second p-type semiconductor layer is between the first p-type semiconductor layer and the n-type semiconductor layer such that the second concentration is directly adjacent to the n-type semiconductor layer, and

wherein the first concentration is located at a position x_o and defines a concentration p_o, and further wherein the graded doping concentration is governed by the following equation:

$$p = p_o e^{\frac{-x}{D}}$$

over the depth D of the second p-type semiconductor layer for all x and D greater than zero.

17. (Original) A photodiode having a first p-type semiconductor layer and an n-type semiconductor layer comprising:

a second p-type semiconductor layer disposed between the first p-type semiconductor layer and the n-type semiconductor layer such that the second p-type semiconductor is directly adjacent to the n-type semiconductor, the second p-type semiconductor layer having a graded doping concentration, wherein the graded doping concentration is governed by the following equation:

$$p = p_o e^{\frac{-x}{D}}$$

over the depth D of the second p-type semiconductor layer for all x and D greater than zero.

18. (Original) The photodiode of claim 17 wherein the second p-type semiconductor layer is a type III-V semiconductor.

19. (Original) The photodiode of claim 17 wherein the second p-type semiconductor layer is InGaAs.